an excellent historical resumé, quite full and very interesting to every student. Of the next chapter, on chemical formulæ and equations, less can be said; the writing of chemical equations cannot readily be reduced to rules. Atoms, atomic mass and valence are next taken up, and well epitomized; the periodic law is then briefly described, and the author well says: "Although the periodic law cannot as yet give a logical explanation of all these phenomena, still it stands unquestioned, that it is one of the most far-reaching, if it be not the most important law of chemistry." These two chapters, which condense the whole of Lothar Meyer's Moderne Theorie der Chemie, might have been wisely expanded to several times their volume without being disproportionate to the rest of the book. Molecules, molecular mass (including osmotic pressure), and the structure of molecules follow, and then a long chapter is devoted to stoichometrical calculations. Chemical arithmetic should certainly be thoroughly studied in 'practical' chemistry, yet the very fact of its being included in this book reflects a felt need. The concluding chapters are on energy: chemical energy (in which there is an excellent summary on measurement of chemical affinity) and photo-chemistry, thermal energy and thermo-chemistry, and electrical energy and electro-chemistry. The book closes with a quite complete bibliography of over two hundred titles of works relating to the material considered in the book, more than one-half published within the last decade.

The book is very free from typographical errors as well as from errors of statement. It is unfortunate that the terms specific gravity and density of gases should be used interchangeably; specific gravity is best used for air as the standard, and density confined to those cases where the unit is hydrogen.

Jas. Lewis Howe.

Washington and Lee University.

The Argentaurum Papers. No. 1. *Some Remarks Concerning Gravitation.* Addressed to the Smithsonian Institution, the American Association for the Advancement of Science, * * * and all learned bodies. By Stephen H. Emmens, member of the American Institute of Mining Engineers, etc. The Plain Citizen Publishing Co., New York.

It is not generally worth while for any one other than a psychologist or an alienist to look beyond the title page of so pretentious a work as this first installment of the *Argentaurum Papers.* But the author of this pamphlet of 150 octavo pages has contrived to exploit himself so extensively in the advertising columns of respectable journals, including Science,* that his work demands a brief notice.

The only part of the paper of any value is the 'Envoy,' which occupies the last twenty pages and gives the author's biography along with a list of his numerous publications. From this envoy it appears that in his academic days he was a prize man in chemistry, physics, logic and other subjects; that he has published treatises on pure and applied logic, Locke on the conduct of the human understanding, the philosophy and practice of punctuation, etc.; and also that he has published 'well-received' work in the domain of fiction. We learn with regret that he is at present a paralytic. "I have for the last nineteen years been paralyzed," he says, "by an injury to my spine, and am unable to move about with freedom." This might make us charitable, but he is too vigorous and clever a paralytic to implore any lenity; for he adds, stoically, "I do not say this by way of any excuse. No physical disability is a valid apology for bad work. Cripples must not *inflict* themselves upon other people."

As to the fate of his work he is fully resigned. He says: "I am prepared to be told, in the first place, that I am ignorant and foolish; that

* The insertion in Science of an advertisement of a book which we review so unfavorably may seem to need an explanation. In the contract with The Macmillan Co. the right is given to the responsible editor to veto any advertisement, but it is not desirable to use this power unless necessary. The author of the present book is said to have done good scientific work, and it would doubtless seem to him and to others like persecution not to permit him to bring his book to the attention of men of science. It is our duty to condemn the book according to our judgment, but the history of thought demonstrates that it is wrong to suppress freedom of speech or of publication. J. McK. C.

I have ventured into a field without even a decent equipment of knowledge, and that I have altogether failed to understand the real meaning and bearing of the accepted teachings of modern science." We beg to state gently but firmly that this indictment is strictly correct in all particulars. The author of this screed on gravitation demonstrates conclusively: first, that he does not understand the fundamental concept of Newton's law of attraction; secondly, that he does not know enough of elementary mathematics to apply this law to the simple case of a homogeneous sphere; and, thirdly, that he possesses little of the caution which is born of a knowledge of things physical. He illustrates well the colossal impudence of those pseudo-scientists whose equipment consists of formal logic and a facile pen. W.

SCIENTIFIC JOURNALS.

PHYSICAL REVIEW, VOL. IV., NO. 4, JANUARY–FEBRUARY, 1897.

The Freezing Points of Dilute Aqueous Solutions, III.: By E. H. LOOMIS. This paper is devoted to a continuation of Dr. Loomis' experiments on the lowering of the freezing point by dissolved substances. The method is the same as that previously employed. In the present series of experiments the substances tested were chiefly chlorides and phosphates, though several of the more important organic acids were also used.

Since the substances employed were electrolytes, Dr. Loomis' results afford a check upon the theory of electrolytic dissociation, osmotic pressure, etc. As in the case of his earlier measurements, the agreement is entirely satisfactory only in few cases. It is well known, however, that the ordinary formula for the lowing of the freezing point depends upon several assumptions and approximations of a very doubtful character. So that it seems not improbable that the apparent discrepancies that are brought out by Dr. Loomis' measurements may lead to an improvement in the whole theory.

A Method for Energy Measurements in the Infra-red, and the Properties of the Ordinary Ray in Quartz for Waves of Great Wave-Length: By E. F. NICHOLS. This article contains two important features: first, the description of a new type of instrument for the measurement of infra-red radiation; and second, the account of measurements made with it by which the optical properties of quartz were investigated in the extreme infra-red.

The instrument used by Professor Nichols is a modified form of the Crookes radiometer. It consists essentially of two excessively small vanes mounted upon a fine quartz fibre and suspended in vacuo. The rays to be measured are allowed to fall upon one of the vanes, and a deflection of the system results. The deflection is measured by means of a light mirror. This form of instrument is found to be much more sensitive than any bolometer heretofore used. More important than its increased sensitiveness is, however, its freedom from the various disturbances to which a sensitive bolometer is subject. The radiometer does not depend in its action upon any electric or magnetic forces, and is therefore free from the irregularities which are always present when a sensitive galvanometer is used. The instrument is also capable of being more thoroughly protected against outside temperature disturbances. It can hardly be questioned that this instrument will make a considerable advance in our knowledge of infra-red spectra.

This new type of radiometer was employed in connection with a mirror spectrometer to investigate the reflection and absorption of quartz. For wave-lengths in excess of $4\,\mu$ quartz becomes practically opaque with layers of ordinary thickness. To investigate the absorption a very thin layer was prepared, the thickness being not more than $18\,\mu$. Sufficient energy was transmitted through this film of quartz to be detected, and measurements of absorption were extended to about $8\,\mu$. At that point even this extremely thin layer failed to transmit a measurable amount. Numerous well-defined absorption bands were detected between $4\,\mu$ and $8\,\mu$. The reflecting power of quartz was measured throughout the same range of wave-lengths by comparison with silver. Making use of the Cauchy formula, the index of refraction was then computed from the observed values of the